



MECH 410U

Air Pollution, Technology, and Society

Time Mon Wed Fri 1-2PM, MacLeod 214

**Instructor**

Prof. Naomi Zimmerman  
[nzimmerman@mech.ubc.ca](mailto:nzimmerman@mech.ubc.ca)  
[mech.ubc.ca/naomi-zimmerman](http://mech.ubc.ca/naomi-zimmerman)  
CEME 2066  
Office Hours: TBD  
(604) 822-9433

**Teaching Assistants**

1. Mrinmoy Chakraborty  
Email: [mrinmoy.chakraborty@ubc.ca](mailto:mrinmoy.chakraborty@ubc.ca)

This syllabus and schedule is subject to change.

**Course Description:** The causes and effects of air pollution in the context of technology and society. Main topics include: Identifying air pollutants and their impact on air quality and climate change, basic atmospheric science and meteorology, introduction to regulation and control, collective societal action, environmental justice, global vs. local considerations, economics of air pollution, tradeoffs, and the role of engineering design.

**Prerequisite(s):** 3rd Year or higher.

**Credit Hours:** 3

**Text(s):** *Fundamentals of Air Pollution*, 5<sup>th</sup> Edition

**Author(s):** Daniel Vallero

**ISBN:** 978-0-12-401733-7

**Availability:** Free online through the UBC Library

**Course Objectives:**

At the completion of this course, students will be able to:

1. Explain fundamental concepts of air pollution (air quality, climate, and health effects)
2. Identify key air quality and climate change pollutants, their sources, and control technologies
3. Describe the role of engineering in managing air pollution
4. Understand the air pollution policy process in Canada, and the basics of international air quality management
5. Assess the social and economic impacts of air pollution using economic tools (e.g., externalities) or policy-tools (e.g., environmental impact assessment)
6. Identify examples of sustainable design and development in the context of air pollution
7. Critically assess potential design trade-offs in terms of air quality, climate, health, and economics
8. Communicate technical analysis to policy makers and the public in writing (policy briefs) and orally (presentations on grand challenges)

## Grade Distribution:

Policy Brief	20%
Presentation (Grand Challenges)	20%
Participation	10%
Midterm	15%
Final Exam	35%

## Course Policies:

- **General**

- To pass the course, you must achieve a weighted average of at least 50% on the combination of the midterm and final exam, otherwise the grade will be capped at 49%.
- Students using laptops in class are asked to sit in the back rows to avoid distracting other students.
- Phones and other devices must be on silent during the lectures.
- Midterms and final exams are closed book, closed notes.

- **Assignments**

- Students are expected to work independently, except in the case of group projects. **Offering and accepting** solutions from others is an act of **plagiarism**, which is a serious offense and **all involved parties will be penalized according to the Academic Honesty Policy**. Discussion amongst students is encouraged, but when in doubt, direct your questions to the professor or teaching assistants.
- **Late assignments will not be accepted except in the case of illness or other acceptable circumstances.**

- **Attendance and Absences**

- Students are responsible for all missed work, regardless of the reason for absence. It is also the absentee's responsibility to get all missing notes or materials.

## Academic Integrity:

The academic enterprise is founded on honesty, civility, and integrity. As members of this enterprise, all students are expected to know, understand, and follow the codes of conduct regarding academic integrity. At the most basic level, this means submitting only original work done by you and acknowledging all sources of information or ideas and attributing them to others as required. This also means you should not cheat, copy, or mislead others about what is your work. Violations of academic integrity (i.e., misconduct) lead to the breakdown of the academic enterprise, and therefore serious consequences arise and harsh sanctions are imposed. For example, incidences of plagiarism or cheating may result in a mark of zero on the assignment or exam and more serious consequences may apply if the matter is referred to the Presidents Advisory Committee on Student Discipline. Careful records are kept in order to monitor and prevent recurrences.

For more information please visit: <http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,286,0,0>

### Tentative Course Outline:

The weekly coverage might change as it depends on the progress of the class.

Week	Content
January 6-10	<ul style="list-style-type: none"><li>• Introduction to Air Pollution</li></ul>
January 13-17	<ul style="list-style-type: none"><li>• Air and Climate Pollutants</li></ul>
January 20-24	<ul style="list-style-type: none"><li>• Atmospheric Science and Meteorology</li></ul>
January 27-31	<ul style="list-style-type: none"><li>• Industrial emissions and control</li><li>• GC #1 Presentations: Shared knowledge of lessons learned</li></ul>
February 3-7	<ul style="list-style-type: none"><li>• Mobile source emissions and control</li></ul>
February 10-14	<ul style="list-style-type: none"><li>• Natural source emissions and control</li><li>• GC #2 Presentations: Extending air pollution information</li></ul>
February 17-21	<ul style="list-style-type: none"><li>• <b>Midterm break, no class</b></li></ul>
February 24-28	<ul style="list-style-type: none"><li>• The policy process and policy evolution</li><li>• <b>Midterm: Feb 28, in class</b></li><li>• <b>Introduction to writing policy briefs</b></li></ul>
March 2-6	<ul style="list-style-type: none"><li>• Environmental Justice</li><li>• GC #3 Presentations: Characterizing real-world exposures</li></ul>
March 9-13	<ul style="list-style-type: none"><li>• Collective action and public support</li></ul>
March 16-20	<ul style="list-style-type: none"><li>• Global vs. local considerations</li><li>• GC #4 Presentations: Improvements to control technologies</li></ul>
March 23-27	<ul style="list-style-type: none"><li>• Economics of air pollution, cost-benefit analysis, externalities</li></ul>
March 30- April 3	<ul style="list-style-type: none"><li>• Future trends and directions</li><li>• GC #5 Presentations: Systems thinking and transdisciplinary science</li></ul>
April 6-8	<ul style="list-style-type: none"><li>• Review</li></ul>